The New Hampshire Clean Power Strategy:

A Review

Alberta Environment
June 25, 2002

Authored by Danuta Andzelm. Danuta Andzelm is a graduate of the University of Alberta's Master of Business Administration Program. She is currently on a work term with the Policy Secretariat in Alberta Environment.

I. Introduction

The purpose of this report is to analyze the New Hampshire Clean Power Strategy (the NHCPS). The analysis is to provide information and insights useful in the exploration of the feasibility of a possible Alberta-based air emission trading system.

The NHCPS was used as a basis for multi-pollutant reduction legislation that was passed by the State of New Hampshire in May of 2002. The differences between the NHCPS and the final version of the legislation are outlined in this paper.

II. Overview of the NHCPS

Goals:

- To substantially reduce air pollutant emissions originating at all existing large fossil fuel-burning electric power plants
- To combat New Hampshire's (NH's) health and environmental problems
- To assure sustainable growth of NH's economy

General Description:

The NHCPS was developed to address i) the risks to NH's environment and public health associated with power plants emissions; ii) the opportunities that an integrated approach offers for significant, simultaneous reductions of multiple pollutants; iii) the NH Legislature's expectations for environmental improvement under electric deregulation.

Coverage of air pollutants:

NH's major health and environmental problems arise from fine particulate matter (PM), ground-level ozone (smog), acid deposition, mercury and other toxics, greenhouse gas emissions, eutrophication, and regional haze. To combat these problems, the NHCPS proposes statewide emission limitations on four key pollutants: SO2, NOx, mercury, and CO2.

New Hampshire Department of Environmental Services (DES) strongly believes in the opportunity to achieve multiple benefits (co-benefits) through "two-for-one" or "three-for-one" reductions. A 1999 exercise, designed to secure such co-benefits within the electric generation sector, modeled the multiple pollutant reductions that would occur in New Hampshire under this approach. Interestingly, this study was initiated by the Clean Energy group (CEG), an organization of Northeastern power companies. Its results showed that one set of reasonable measures would simultaneously reduce SO_2 emissions by 49 percent, NO_x by 46 percent, particulates by 48 percent, and CO_2 by 31 percent. Mercury emissions were not modeled as part of this exercise.

Coverage of sectors:

The NHCPS is intended to apply to all existing fossil fuel-burning power plants with a capacity of 25MW or greater, which is the same applicability threshold used by EPA's NOx SIP Call. The NOx SIP call was designed to mitigate significant transport of NOx in the Ozone Transport Region (OTR). Under this criterion, Merrimack Station Units 1 and

2 in Bow, Newington Station in Newington, and Schiller Station Units 4, 5, and 6 in Portsmouth would be subject to the NHCPS's provisions.

All of these plants were built prior to the Clean Air Act Amendments (1977) and were not required to meet new more stringent emissions standards due to their "grandfathered" status and expectations that they would soon be retired. Nevertheless, they continue to operate and emit a large proportion of the identified problematic pollutants. It is worth noting that power plants contribute 81% of SO2, 20%of NOx, 40% of mercury, and 30% of CO2 emissions in NH. They are the major emitter of SO2 and mercury, and the second largest emitter of NOx and CO2, just behind transportation.

The analysis of NH's utility industry showed that the new technology plants generate electricity three times more efficiently and their generating capacity is 30% higher than the old "grandfathered" plants, despite their dramatically lower emissions. For example, the old plants emit 55,693 tons of SO2 annually compared to 279 tons emitted by the new plants. In addition, as mentioned earlier the old facilities are not subject to the same emission controls as the new plants. This uneven treatment of market participants creates an environmental subsidy for the old plants, the cost of which is shifted to the public.

The future of NH's environmental efforts could be affected by the ongoing deregulation of the electric utility industry. Some of the principles of the Electric Utility Restructuring legislation include: encouraging long-term environmental sustainability, equitable treatment of old and new generation sources with regard to air pollution controls and costs based on comparable criteria, and preference for market-driven mechanisms such as trading to regulatory controls.

Emissions Limits:

- **Limits proposed by the NHCPS**

Consistent with NH national and regional pollutant reduction programs, the NHCPS proposes the following emission reduction targets for all four pollutants:

SO2—75% further reduction, above and beyond the Phase II requirements of Title IV of the federal Clean Air Act (i.e., the Acid Rain Program) that took effect in 2000, reducing total New Hampshire SO2 emissions from these sources by 89% since 1990;
NOx—70% further reduction in annual NOx emissions, above and beyond the 68 percent annual (76% seasonal) NOx reduction that New Hampshire has already achieved, reducing total New Hampshire NOx emissions from these sources by 90% since 1990.
Mercury—75% reduction in annual mercury emissions from coal-burning power plants compared to recent (1996/1997) emissions.
CO2—7% reduction below 1990 CO2 emission levels, reducing annual CO2 emissions from these sources to approximately 10% below current annual New Hampshire CO2 emissions.

The table below represents emissions caps for these compounds.

Table 2. Annual emissions caps under the NHCPS starting in 2006

Pollutant	Baseline period	Estimated Emissions Tons/year	Baseline tons	Cap tons	Reduction from Baseline
SO2	Current Allocation under Acid Rain Program	55,686	29,566	7,289	75%
NOx	Current NOx requirements	12,077	12,077	3,644	70%
Mercury	1996/1997	-	328 lbs.	82 lbs.	75%
CO2	1990	-	5,425,866	5,046,055	7%

Source: the NHCPS

- **Derivation of emissions caps**

The NHCPS recommends emissions caps based on electricity generated, rather than fuel used, to encourage efficiency.

SO2 emissions cap—derived by multiplying 1999 actual total MWh generated by all three affected power plants by 3.0 lb SO2/MWh.
→ 3.0 lb SO2/MWh—proposed based on the federal new source performance standards; current SO2 requirements—11.46 lb/MWh.
NOx emissions cap —derived by multiplying 1999 total actual MWh generated by all three affected power plants by 1.5 lb NOx/MWh.
→ 1.5 lb NOx/MWh—proposed based on the federal new source performance standards and EPA's NOx SIP call; current NOx requirement—5.0 lb/MWh.
Mercury emissions cap—derived by multiplying recent mercury emissions (1996/1997) by 25%.
CO2 emissions cap—derived by multiplying estimated 1990 total CO2 emissions by 93%.

- **Changes resulting from the legislative revision**

SO2 and NOx—The State of NH approved the proposed annual emissions caps.

Mercury—There was a discrepancy as to how much mercury is really emitted from the power plants. To obtain a reliable level of mercury emissions, the affected sources are required to conduct stack testing for mercury over a one-year period (to be completed by July 2003). Further, the U.S. Environmental Protection Agency (EPA) proposed a regulation establishing a Maximum Achievable Control Technology (MACT) from utility boilers. This regulation should be complete by the end of 2003. Before the end of March 2004, DES is required to recommend a cap for mercury.

CO2—After considering economic impacts, some legislators felt that the recommended cap was too stringent and would impede the growth of the NH economy. The approved cap of 5,425,866 is the same as the baseline (1990) and will be applicable until 2010. Even though this cap is higher than the initial recommendation, it is 3% lower than the 1999 level of CO2 emissions. Before the end of 2004, DES is required to recommend a lower cap for Phase II of the program.

Timing:

The proposed implementation year of 2006 was selected to allow the affected power plants a reasonable time frame to plan and realize the strategies necessary to achieve set caps.

Accountability:

Sources must develop and file a compliance strategy with DES detailing technologies, operational modifications, and market-based approaches that they expect to use to meet the emission caps. Sources will also be required to monitor and report emissions and electrical generation, and hold sufficient allowances to cover annual emissions.

Market mechanisms:

To meet the NHCPS's goals, NH will employ proven national market-based strategies for cost effectively reducing pollution. The NHCPS recommends the following:

- **Averaging Among Units at a Single Facility**

The sources will be able to comply with their SO2, NOx, and CO2 emission caps by averaging across applicable operating units ((i.e., boilers, turbines, etc.) at any single facility or site. Each individual unit will not be required to demonstrate that it meets the applicable cap, as long as the facility as a whole does so.

For some facilities, meeting the emission caps fully on a unit-by-unit basis may not be possible. In addition, DES predicts that unit-specific caps would likely put the electric system reliability at greater risk because the affected sources might switch to a single fuel source such as natural gas, putting a significant portion of production out of service for the installation period. The experience shows that equivalent reductions can be achieved –at equal or less cost—through cap and trade approaches without elevated reliability risk.

- **Averaging Among Multiple Facilities Owned by the Same Company**

The sources will be able to comply with their SO2, NOx, and CO2 emission caps by averaging among units at different facilities within New Hampshire owned by the same company. This flexibility will enable companies to achieve the required reductions in the most cost-effective way.

- **Banking of Early Reductions**

The facilities will be allowed to bank early reductions (and unused allowances from New Hampshire's NOx Budget Trading Program and the federal Acid Rain Program, if any) and to carry them forward for future use under the NHCPS. Banking has proven to be

an effective motivator for companies to achieve emission reductions both prior to compliance dates and beyond regulatory requirements. For example, in 1998, the Public Service Company of New Hampshire (PSNH) voluntarily undertook additional early NOx reductions equivalent to more than one-third of its allowable summer NOx emissions.

- **Use of Allowances for Compliance (i.e., "Cap and Trade")**

New Hampshire has successfully employed federal and regional "cap and trade" regulatory approaches for SO2 and NOx emissions since 1995. The state's goal is to be as consistent as possible with present and future federal and regional regulations and programs. Not surprisingly, the State of NH approved the use of similar market-based systems for SO2, NOx, mercury, and CO2.

The affected sources may use SO2, NOx and CO2 allowances from federal or regional trading and banking programs or other programs acceptable to DES. Future mercury allowances will be acceptable in meeting that portion of the emission cap that is more stringent than federal requirements.

- **Allocation of allowances**

Allowance means a limited authorization to emit one ton of SO2, one ton of NOx, one pound of mercury, or one ton of CO2 during a specified year. Allowances, up to the amount of established caps will be allocated to each affected source based on the electricity output of the source. For example, if a source generates 20% of the total MWh produced by the all affected sources, it will obtain 20% of allowances. DES must make publicly available all allocations prior to the effective date of such allocations.

III. Steps taken by DES to develop the NHCPS

- **Research and Analysis (over 6 months)**

1. DES reviewed recent studies related to air quality in NH, including the EPA's *Cumulative Exposure Project* and Abt Associates' *Health Impacts Analysis.*
2. DES addressed the environmental threats by updating its Clean Air Strategy to reduce emissions of all pollutants from all sources.
3. DES identified and measured contributions of a variety of pollutants identified as environmental/health problems. The analysis showed that major contributors to NH health and environmental problems are: SO2, NOx, mercury and CO2.
4. To identify the major emitters of these pollutants, DES divided all emission sources into three general categories: stationary sources, mobile sources and area sources. The next step was to measure which categories or sources within these categories were responsible for major emissions of pollutants under investigation. The analysis showed that power plants emit a large proportion of these four pollutants.

5. At this point, DES examined concerns raised by different organizations about the disproportionate environmental impacts that result from old, "grandfathered" power plants compared to new facilities. This public consultation led to evaluation of generation efficiencies of identified sources in relation to pollutant emissions. For example, older power plants are characterized both by lower generation efficiencies and higher pollutant emissions compared to newer electricity generators.
6. DES compared the NHCPS with other New England states' plans to develop regional consistency. Initial meetings between state air directors, energy officials, public utility commissioners, and industry have been held to explore this possibility.

- **Development of the NHCPS**

1. **Existing programs:** Before developing the NHCPS, DES reviewed existing regional and national programs and commitments. They found that despite the significant emissions reductions that have been achieved under these programs, the results are still far from what is required to sustain NH's quality of life. The NHCPS was developed to achieve just that.
2. **Applicability:** To identify specific emitters, DES applied thresholds used by EPA, such as, EPA's NOx SIP Call for power plants with capacity of 25MW or greater.
3. **Pollutant-by-pollutant or multi-pollutant approach:** In 1999, DES conducted an exercise to model the multiple pollutant reductions that would occur in NH under an integrated approach designed to secure multiple benefits compared to traditional benefits. The model proved the superiority of the integrated approach.
4. **Emissions limits:** The emissions limits were established at levels to benefit the key elements of quality of life in NH: public health, environment/ecosystems, and the economy.
5. **Time frames:** DES proposed such time frames as to allow the affected sources a reasonable time period to plan and implement the control strategies necessary to achieve specified caps.
6. **Market-based approach:** In developing the NHCPS, DES consulted EPA's most recent guidance to determine which, if any, emissions averaging, banking, and trading programs should be included in this emission reduction strategy. The following lists the practices suggested by EPA and considered effective and consistent with NH's practice:
    - Averaging among units at a single facility
    - Averaging among multiple facilities owned by the same company
    - Banking of early reductions
    - Use of allowances for compliance—"cap and trade" system

    DES considered the pros and cons of allowing facilities to use SO2, NOx, and CO2 allowances. To make a decision, DES consulted an October 2000 report prepared by Energy Ventures Analysis for the New England Competitive Power Coalition (an organization of independent power producers and power marketers).
    Special consideration had been given to mercury, for which the proposed "cap and trade" system may not be as appropriate as it is for SO2, NOx, and CO2. In

developing rules to implement the NHCPS, DES will factor in on-going EPA's analysis on mercury emissions control and trading.

7. **Implementation approach:** DES sought legislative authorization for the NHCPS to avoid future weakening or overturning of the resulting program.
    - The final amended version of the mutli-pollutant reduction program was adopted in May 2002.

References:

1. The NHCPS http://www.des.state.nh.us/ard/NHCPS_draft.pdf
2. House Bill 284, Multi-Pollutant Reduction Program http://www.gencourt.state.nh.us/legislation/2002/HB0284.html
3. NH DES contact
4. NH DES website: http://www.des.state.nh.us/ard_intro.htm
5. Utility Industry Restructuring http://gencourt.state.nh.us/rsa/html/XXXIV/374-F/374-F-3.htm